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(71) Applicant

John Rhoden,

9 Murray Street, Atherton, Manchester M29 0BH

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E2F

(72) Inventor

John Rhoden

(74) Agent and/or Address for Service

W P Thompson & Co,

Coopers Building, Church Street, Liverpool L1 3AB

## (54) Improvements in or relating to hinge assemblies

(57) A hinge assembly for a shower enclosure door has two frame members (10,12) and a plurality of separate hinge units (21,22,23) secured to each frame member alternately. A hinge core (25) passes through the hinge units secured to each frame member, and the hinge units are rotatable on the hinge core, whereby the frame members are hingedly interconnected.

The hinge units (21,22,23) are provided with a longitudinal key (27) which fits into a corresponding keyway (20) in the frame member. The key may be slidable into the keyway or may be a press-fit into the keyway.

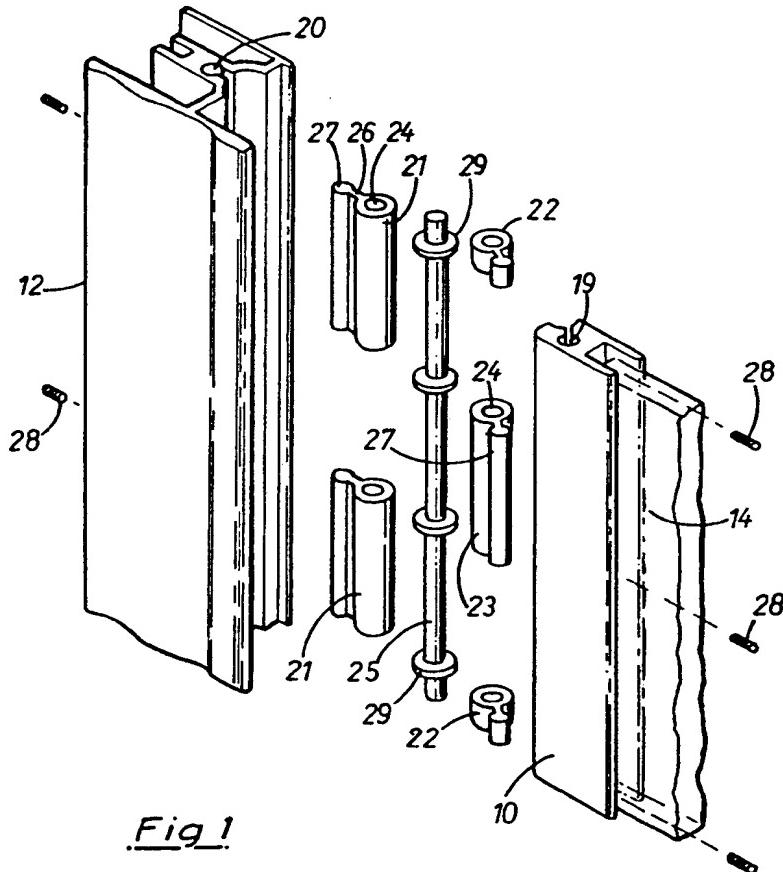


Fig 1

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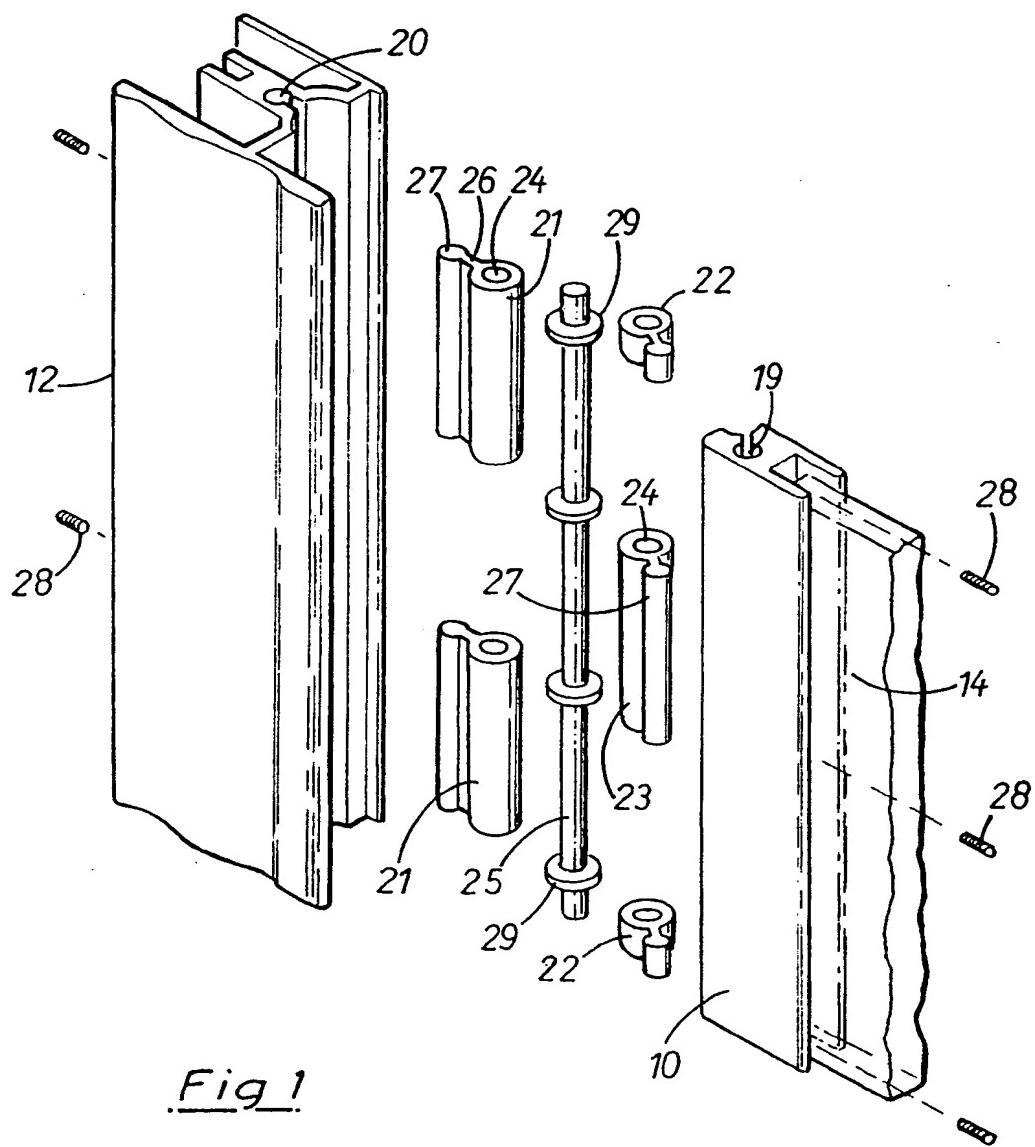


Fig 1

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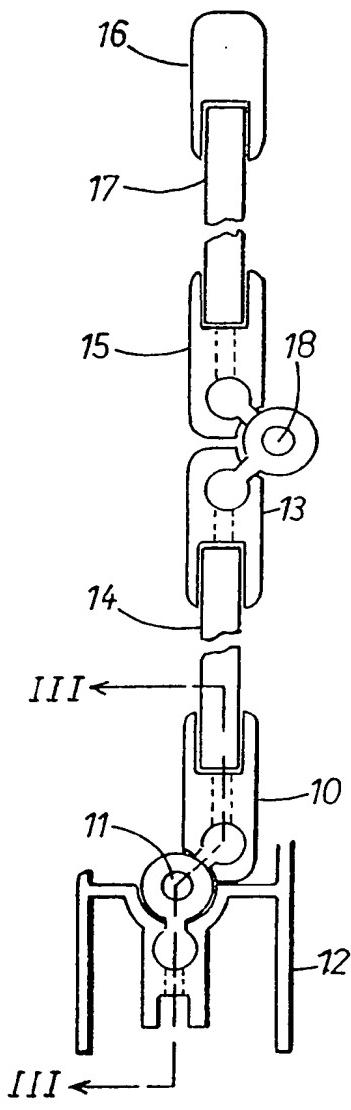


Fig 2.

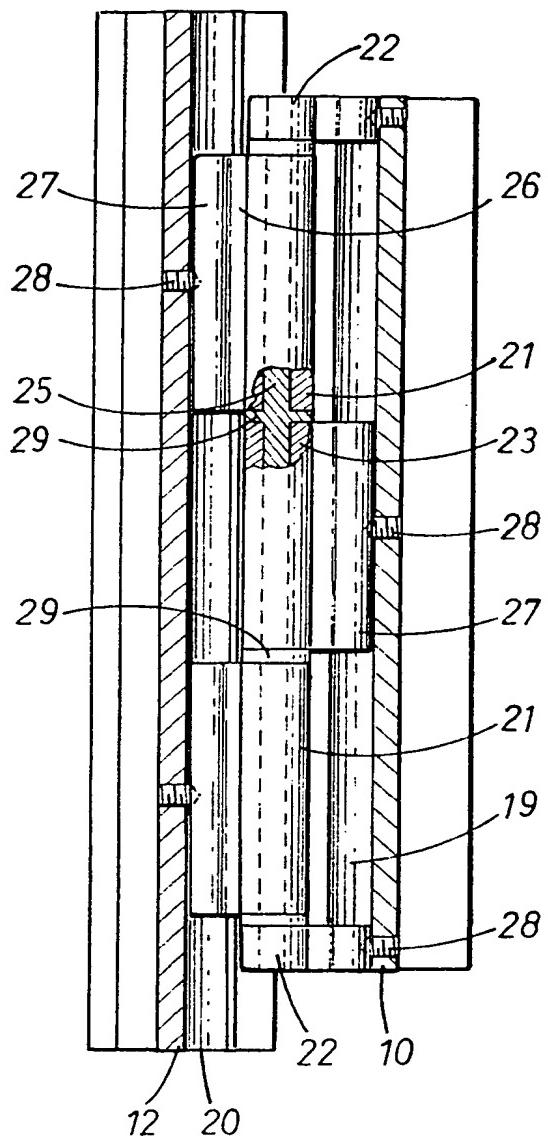
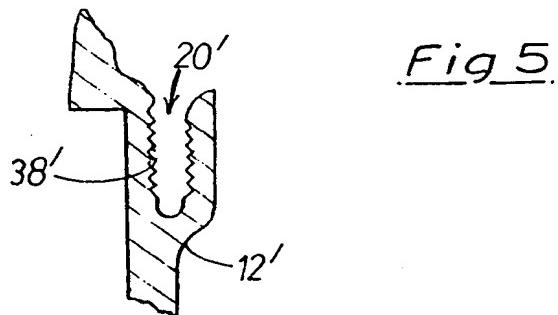
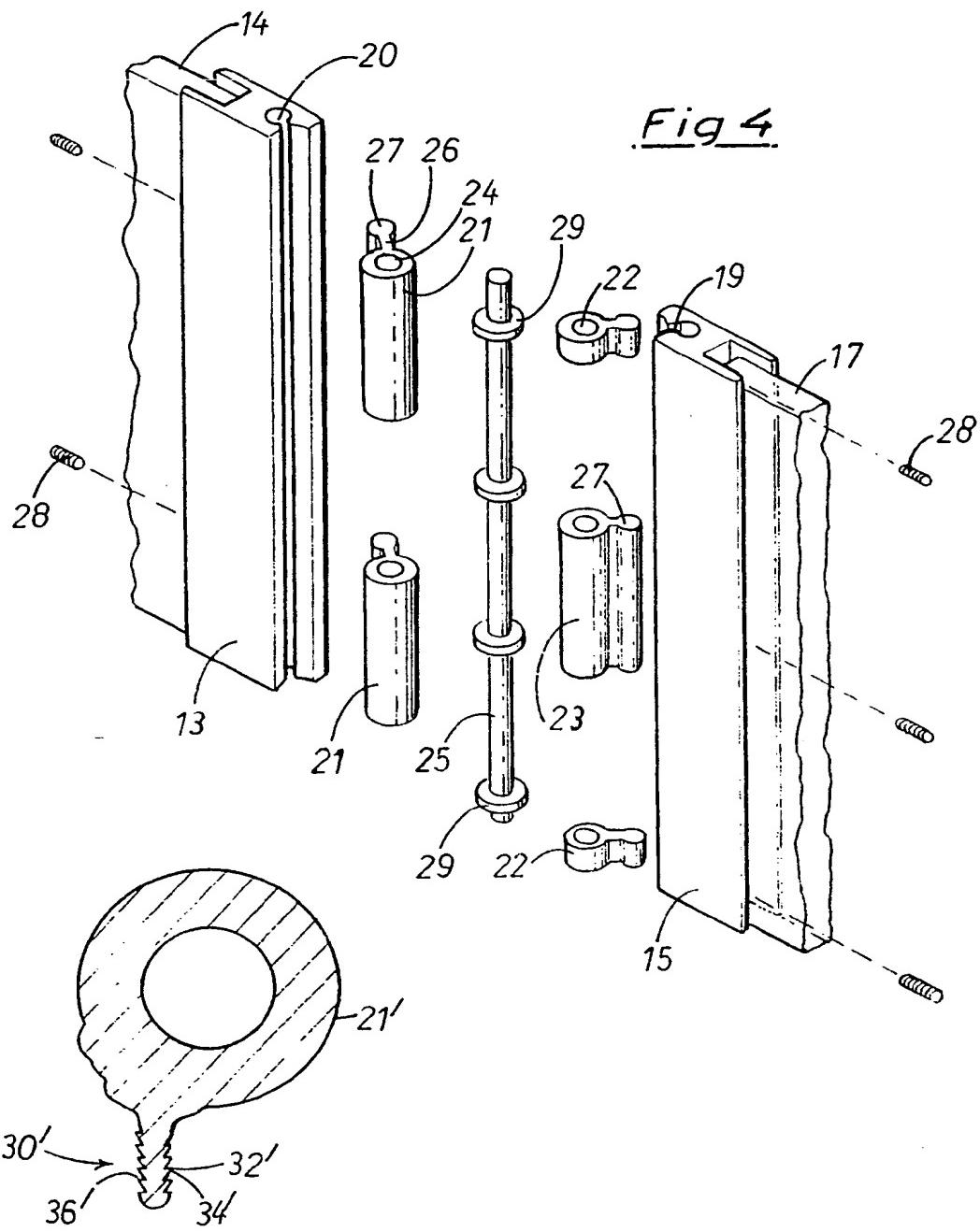


Fig 3.

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**SPECIFICATION****Improvements in or relating to hinge assemblies**

5 This invention relates to hinge assemblies. One of the most important requirements for a shower enclosure is the provision of suitable hinges for the door of the enclosure, especially a folding door. Such hinges should be convenient to manufacture, easy to fit in assembling the shower enclosure and also efficient in operation.

According to the present invention, there is 15 provided a hinge assembly for a shower enclosure door, said Assembly comprising two frame members, a plurality of mutually independent or separate hinge units, at least one of which is secured to one of the frame 20 members and at least another of which is secured to the other frame member, and a hinge core passing through the hinge units secured to each frame member, the hinge units being rotatable on the hinge core, 25 whereby the frame members are hingedly interconnected.

Preferably the hinge units secured to one frame member alternate with those secured to the other frame member. Thus a hinge unit 30 secured to one of the frame members may be disposed between two hinge units secured to the other frame member.

One of the frame members may be part of a 35 door of the shower enclosure and the other frame member may be that part of the shower enclosure to which the door is hinged. Alternatively, or in addition, the frame members may be the hingedly interconnected parts of a 40 folding door. The term "frame member" is intended to include all members which may be hingedly interconnected by means of the hinge units in the hinge assembly of the invention.

The use of the separate hinge units in the 45 hinge assembly enables a hinge of any desired length to be built up by alternating the hinge units in the assembly, and the invention includes a method of forming a hinge assembly by the steps of securing the hinge units to the frame members, alternating the units and passing a hinge core through the units, the steps being carried out in any appropriate order.

In a preferred form of the invention, each 55 frame member is provided with a longitudinal keyway and each hinge unit includes, in addition to an axial hole for the hinge core, a corresponding key for insertion in the keyway, whereby the hinge unit may be secured to the 60 frame member. The key may be slidable within the keyway to facilitate building up a hinge from a plurality of hinge units and means may be provided to prevent relative movement between the key and the keyway 65 when the hinge unit has been positioned, for

example grub screws passing through the frame member into the key of the hinge unit. To prevent lateral withdrawal of the key while sliding within the keyway, the key may be a headed key.

To facilitate rotation of the hinge units on the core, the hinge units may be separated from one another in the hinge assembly by washers disposed upon the hinge core.

70 The frame members and hinge units may be made from suitable material but it is preferred to make them from aluminium as this enables the frame members and hinge units to be formed conveniently by extrusion. The frame members may also be produced in a variety of shapes to enable the hinge to be used in conjunction with other materials and for other functions, so that it may be screwed to, or bolted to, or otherwise fastened to these 75 materials, thus replacing or functioning as a conventional hinge. Again, the material of the hinge core should have adequate strength (for example, steel, nylon, etc), and the material of the washers may be chosen to minimise friction in the hinge.

The construction of the hinge assembly of the invention facilitates making the assembly self-opening or self-closing. It has been surprisingly found that if the hinge core is made of a resilient material, such as nylon, torsion may be applied to the core by twisting it and if the ends of the core are secured such as by pinning to prevent untwisting, then the assembly may be made self-opening or self-closing, depending on the direction of twist of the core.

The invention will now be further described by way of example only with reference to the accompanying drawings, in which:

105 Fig. 1 is an exploded perspective view of a first embodiment of hinge assembly according to the invention, for connecting a shower enclosure door to a shower enclosure,

Fig. 2 is a plan view of a folding door 110 assembly incorporating the hinge assembly shown in Fig. 1,

Fig. 3 is a section taken on the line 3-3 of Fig. 2;

Fig. 4 is an exploded perspective view of a 115 hinge assembly for connecting the parts of the folding door shown in Fig. 2; and

Fig. 5 is an enlarged, exploded cross-sectional view of two components of a second embodiment of hinge assembly according to the invention.

Referring first to Fig. 2, a frame member 10 of a folding door is hinged about an axis 11 to a frame member 12 of a shower enclosure. The door is in two main parts, one 125 of which comprises the frame members 10 and 13 which support a glass panel 14 and the other of which comprises frame members 15 and 16 which support a glass panel 17. The frame members 13 and 16 are hinged together about an axis 18, whereby the door 130

folds.

Figs. 1 and 3 illustrate the hinged connection between the frame members 10 and 12 of Fig. 2. Keyways 19 and 20 are located longitudinally in frame members 10 and 12 respectively. Hinge units 21 are secured to frame member 12 and hinge units 22, 23 are secured to frame member 10. Each hinge unit has a cylindrical axial hole 24 through which a cylindrical hinge core 25, preferably of nylon, passes. Each hinge unit also includes a key 26 terminating in a key head 27 whereby the units 21 are slidable in the keyway 20 for location purposes, and the units 22, 23 are similarly slideable in the keyway 19 but the head 27 prevents lateral withdrawal of the unit from the keyway during sliding. The necessary working tolerances between the key head 27 and the keyway 20 allow a certain degree of clearance which is detrimental to the working of the hinge. This is taken up by drilling a hole through the rebate in each frame member (10 and 12; also 13 and 15, Figure 2), tapping this hole and inserting a grub screw 28 which tightens up on the key head 27. The tendency for the components to slide longitudinally is controlled by drilling further similar holes and inserting spiral steel dowels into the key head (not shown). The hinge units are separated by washers 29 on the core 25, the washers being slid onto the core during assembly of the hinge units on the core, which serves as the hinge axis.

Fig. 4 illustrates the hinged connection between the frame members 13 and 15 of Fig. 2, but the hinge assembly of Fig. 4 is otherwise very similar to that of Fig. 1 and its construction will be readily understood by referring to those reference numerals on Fig. 4 which are the same as in Fig. 1. Also shown in Fig. 4 are the glass panels 14 and 17 of Fig. 2. The arrangement shown in Fig. 4 enables the door to fold, while that in Fig. 1 enables it to open and close. By providing an appropriate degree of torsion in the hinge cores, the hinge assembly shown in Fig. 1 may be made self-closing, and that in Fig. 4 self-opening, so that the torsion in the cores holds the door closed (and unfolded).

There is no limiting factor on the shape of the key head or the keyway shown in the drawings, and this may be varied depending on manufacturing circumstances.

As shown in Figures 1 to 4 of the drawings, the hinge unit 23 alternates with the hinge units 21 and the assembly is terminated by end hinge units 22. Although only five hinge units are shown in the drawings, the hinge assembly may be of any desired length in relation to the frame members. The assembly may be continuous in the manner of a piano hinge or it may be interrupted to simulate an arrangement of conventional door hinges. Moreover, the length of the hinge units 21, 23 may be varied depending on the use to

which the hinge is put and the number of units per hinge and permutation of lengths is infinitely variable.

Referring to Fig. 5, two components of a second embodiment of hinge assembly according to the invention are illustrated. The components are on elongate hinge unit 21' and on elongate frame member 12' (only part of which is shown), which are similar to the hinge unit 21 and frame member 12 of the first embodiment, except in the way they are fitted together. Extending from the hinge unit is an elongate extension 30' with a plurality of elongate teeth 32' extending parallel to the longitudinal axis of the hinge unit 21'. The planes of the faces 34' facing away from the hinge unit are inclined at an angle of 26° to the plane of the elongate extension 30', whereas the planes of the faces 36' facing towards the hinge unit are perpendicular to the plane of the elongate extension 30'. This is to allow easy insertion of the extension 30' into a keyway in the frame member and to prevent removal from the keyway as will be explained.

The frame member 12' is provided with an elongate keyway 20', having a plurality of elongate grooves 38'. The plane of the faces are inclined at 45° to the plane of the elongate keyway 20', and hence are designed not to mate precisely with the teeth 32' of the hinge unit 21'.

In use, the hinge units are arranged on an elongate core with the necessary washers, as in the first embodiment. As in the first embodiment, the hinge units fit alternately into two frame members, one 12' of which is illustrated. The elongate extensions 30' are then pressed into the keyways 20' in the frame members, where the elongate teeth 32' mate roughly with the elongate grooves 38'. The extensions 30' may be pressed into the keyway because of the inclined faces 34' of the teeth, but are restricted from being pulled out by the perpendicular faces 36' of the teeth. Moreover, because the teeth 32' do not mate exactly with the grooves 38', the teeth 32' are deformed and are thus gripped tightly in the groove. This dispenses with the requirement for the grub screws of the first embodiment, although in use adhesive is used to adhere the extension 30' in the keyway 20' for extra strength and to prevent retraction of the hinge units from the keyways.

The invention thus provides an efficient hinge assembly which may be readily manufactured and assembled.

While the invention has been described with particular reference to shower enclosure doors, it will be appreciated that the hinge assembly of the invention may be used with any other type of structure requiring a hinge.

#### CLAIMS

1. A hinge assembly comprising two frame

- members, a plurality of mutually independent or separate hinge units, at least one of which is secured to one of the frame members and at least another of which is secured to the other frame member, and a hinge core passing through the hinge units secured to each frame member, the hinge units being rotatable on the hinge core, whereby the frame members are hingedly interconnected.
- 10 2. A hinge assembly as claimed in claim 1, wherein the hinge units secured to one frame member alternate with those secured to the other frame member.
- 15 3. A hinge assembly as claimed in claim 2, wherein adjacent hinge units are separated by washers.
- 20 4. A hinge assembly as claimed in any of claims 1 to 3, wherein each frame member is provided with a longitudinal keyway and each hinge unit is provided with a corresponding key for insertion in the keyway.
- 25 5. A hinge assembly as claimed in claim 4, wherein the key is a headed key.
6. A hinge assembly as claimed in claim 4 or claim 5, wherein the key is slidable within the keyway.
7. A hinge assembly as claimed in any of claims 4 to 6, wherein the key is a press-fit in the keyway.
- 30 8. A hinge assembly as claimed in any of claims 4 to 7, wherein means are provided to prevent or restrict relative movement between the key and the keyway when the hinge unit has been positioned.
- 35 9. A hinge assembly as claimed in claim 8, wherein the means comprise grub screws passing through the frame member into the key of the hinge unit.
- 40 10. A hinge assembly as claimed in claim 8 or claim 9, wherein the means comprise a plurality of projections on one of the said hinge unit and frame member which engage with a plurality of recesses on the other of said hinge unit and frame member.
- 45 11. A hinge assembly as claimed in claim 10, wherein the hinge unit and the frame member are provided with a plurality of interengageable teeth.
- 50 12. A hinge assembly as claimed in claim 11, wherein the teeth comprise elongate ribs.
13. A hinge assembly as claimed in claim 12 when appendent to claim 7, wherein at least some of the ribs are tapered to allow the key to be press-fitted within the keyway.
- 55 14. A hinge assembly as claimed in any of the preceding claims, wherein at least one of the frame members is part of a door of the shower enclosure and the other frame member is that part of the shower enclosure to
- 60 which the door is hinged.
15. A hinge assembly as claimed in any of the preceding claims, wherein the frame members are the hingedly interconnected parts of a folding door.
- 65 16. A method of forming a hinge assembly
- as claimed in any of the preceding claims, comprising the steps of securing the hinge units to the frame members, alternating the hinge units and passing a hinge core through the hinge units, the steps being taken in any order.
17. A hinge assembly for a shower enclosure door, substantially as herein described, with reference to, and as illustrated in Figures 1 to 4, or Figures 1 to 4 as modified by Figure 5, of the accompanying drawings.
18. A method of forming a hinge assembly for a shower enclosure door, substantially as herein described, with reference to, and as illustrated in Figures 1 to 4, or Figures 1 to 4 as modified by Figure 5, of the accompanying drawings.

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